In the claims:

The claims have not been amended. The following Claim Listing is provided for the Examiner's convenience.

1. (Cancelled)

2. (Previously Presented) A method of fabricating a capacitor, the method comprising:

forming a lower electrode on a substrate;

forming a dielectric layer on the lower electrode; and

forming an upper electrode on the dielectric layer to provide a capacitor that comprises the lower electrode, the dielectric layer and the upper electrode;

wherein forming the lower electrode on the substrate comprises at least forming a ruthenium seed layer using atomic layer deposition on the substrate and forming a main ruthenium layer on the ruthenium seed layer using chemical vapor deposition.

3. (Original) The method of Claim 2, further comprising forming a storage node contact plug on the semiconductor substrate and a storage node that is electrically connected to the storage node contact plug to provide a semiconductor memory device, wherein the ruthenium seed layer is formed on the storage node contact plug.

4. (Previously Presented) A method of fabricating an electrode for a microelectronic device, the method comprising:

forming a ruthenium seed layer using atomic layer deposition on a semiconductor substrate;

forming a main ruthenium layer on the ruthenium seed layer; and

patterning the main ruthenium layer and the ruthenium seed layer to form the electrode;

wherein forming the ruthenium seed layer using atomic layer deposition comprises at least one cycle of:

injecting a ruthenium source into a chamber containing the semiconductor substrate; then

injecting an oxygen-containing gas into the chamber containing the semiconductor substrate; and then

injecting hydrogen-containing gas into the chamber containing the semiconductor substrate, wherein the hydrogen-containing gas comprises molecular hydrogen (H_2) and/or ammonia (NH_3).

5. (Previously Presented) The method of Claim 4, further comprising purging the chamber following the injection of the ruthenium source, the injection of the oxygen-containing gas, and the injection of the hydrogen-containing gas.

6. (Previously Presented) The method of Claim 4, wherein the oxygen-containing gas comprises an O_2 gas, an O_3 gas, and/or an H_2O gas.

7. (Previously Presented) The method of Claim 4, wherein at least one of the oxygen-containing gas or the hydrogen-containing gas is supplied in a plasma phase.

8. (Previously Presented) The method of Claim 4, wherein injecting the ruthenium source, injecting the oxygen-containing gas, and injecting the hydrogen-containing gas into the chamber is performed at least twice until the ruthenium seed layer is grown to a desired thickness.

9. (Previously Presented) The method of Claim 3, wherein the ruthenium seed layer is formed to a thickness of about 5 Å to 50 Å and wherein the main ruthenium layer is formed to a thickness of 50 Å to 300 Å.

10. (Previously Presented) The method of Claim 9, wherein the forming of the main ruthenium layer comprises supplying oxygen at a flow rate of about 1 sccm to 50 sccm and supplying a ruthenium source at a flow rate of about 0.1 ccm to 2 ccm under a pressure of about 0.4 Torr to 0.6 Torr.

11. (Original) The method of Claim 2, wherein the dielectric layer comprises a tantalum oxide layer.

12. (Previously Presented) A method of fabricating an electrode for a microelectronic device, the method comprising:

forming a ruthenium seed layer using atomic layer deposition on a semiconductor substrate;

forming a main ruthenium layer on the ruthenium seed layer;

forming a dielectric layer on the main ruthenium layer; and

forming an upper electrode on the dielectric layer to provide a capacitor;

wherein the main ruthenium layer is formed using chemical vapor deposition;

wherein the forming of the upper electrode comprises:

forming a second ruthenium seed layer using atomic layer deposition on the dielectric layer; and

forming a second main ruthenium layer on the second ruthenium seed layer.

13. (Cancelled)

14. (Previously Presented) The method of Claim 4, wherein the ruthenium seed layer has an oxygen concentration of less than 5%.

15-33. (Cancelled)

34. (Previously Presented) The method of Claim 8, wherein the hydrogen-containing gas is injected into the chamber after the oxygen-containing gas is injected into the chamber but before the ruthenium source is again injected into the chamber.

35. (Previously Presented) A method of fabricating an electrode for a microelectronic device, the method comprising:

forming a storage node contact plug on a semiconductor substrate;

forming a ruthenium seed layer using atomic layer deposition on the storage node

contact plug by injecting a ruthenium source into a chamber containing the semiconductor substrate, and then injecting a first oxygen-containing gas into the chamber containing the semiconductor substrate, and then injecting a second hydrogen-containing gas that is different than the first oxygen-containing gas into the chamber containing the semiconductor substrate; and then

forming a main ruthenium layer on the ruthenium seed layer;

patterning the main ruthenium layer and the ruthenium seed layer to form the electrode;

forming a dielectric layer on the electrode; and

forming an upper electrode on the dielectric layer to provide a capacitor.

36. (Previously Presented) The method of Claim 35, further comprising purging the chamber following the injection of the ruthenium source, the injection of the first oxygen-containing gas, and the injection of the second hydrogen-containing gas.

37. (Previously Presented) The method of Claim 36 wherein the first oxygen-containing gas comprises an O_2 gas, an O_3 gas, and/or an H_2O gas and the second hydrogen-containing gas comprises an H_2 gas and/or an NH_3 gas.

38. (Previously Presented) The method of Claim 37, wherein at least one of the oxygen-containing gas or the hydrogen-containing gas is supplied in a plasma phase.

39. (Previously Presented) The method of Claim 38, wherein the main ruthenium layer is formed using chemical vapor deposition.

40. (Previously Presented) The method of Claim 39, wherein injecting the ruthenium source, injecting the first oxygen-containing gas, and injecting the second hydrogen-containing gas into the chamber is performed at least twice until the ruthenium seed layer is grown to a desired thickness.

41. (Previously Presented) The method of Claim 40, wherein the ruthenium seed

layer has an oxygen concentration of less than 5%.

42. (Previously Presented) The method of Claim 41, wherein the ruthenium seed layer is formed to a thickness of about 5 Å to 50 Å and wherein the main ruthenium layer is formed to a thickness of 50 Å to 300 Å.

43. (Previously Presented) The method of Claim 42, wherein the forming of the main ruthenium layer comprises supplying oxygen at a flow rate of about 1 sccm to 50 sccm and supplying a ruthenium source at a flow rate of about 0.1 ccm to 2 ccm under a pressure of about 0.4 Torr to 0.6 Torr.

44. (Previously Presented) The method of Claim 43, wherein the dielectric layer comprises a tantalum oxide layer.

45. (Previously Presented) The method of Claim 44, wherein the forming of the upper electrode comprises:

forming a second ruthenium seed layer using atomic layer deposition on the dielectric layer; and

forming a second main ruthenium layer on the second ruthenium seed layer.

46. (Cancelled)

47. (Previously Presented) The method of Claim 35, wherein the second hydrogen-containing gas does not include oxygen.